

Application Serial N . 09/478,849

Attorney Docket No. CIC-037-US

In the Drawings:

Applicant submits herewith a marked-up copy of sheet two (2) of the drawings with proposed corrections thereto, as follows:

In Fig. 3, the element presently labeled with reference number 202' is relabeled with reference number 214, and a new element labeled with reference number 202' is added; and

In Fig. 4, the element presently labeled with reference number 318 is relabeled with reference number 317, and is changed to delete the arrow-head thereof; and a new element labeled with reference number 318 is added.

A copy of the marked-up drawing sheet is also submitted for review by the Draftsperson, along with a letter to the Draftsperson in accordance with MPEP § 608.02(r).

Remarks

Applicant respectfully requests reconsideration of the instant application in view of the above amendments and the following remarks.

Drawings

Fig. 3 of the drawings is amended to add a virtual image that is labeled with reference number 202', as supported by the specification on page 4, lines 15-18. The element that had been labeled with reference number 202' is now labeled with reference number 214, which corresponds to the "exit pupil" of the lens 212, as supported by the ray tracing in Fig. 3 associated therewith.

Fig. 4 of the drawings is amended to add a virtual image that is labeled with reference number 318, as supported by the specification on page 8, lines 2-6. The element that had been labeled with reference number 318 is now labeled with reference number 317, which corresponds to the "exit pupil" of the re-imaging lens 316, as supported by the ray tracing in Fig. 4 associated therewith.

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Specification

The specification has been amended to correct an error in the previous amendment, that had failed to include the original changes of "entrance aperture" to --entrance pupil-- on page 8, lines 4, 14 and 17.

The specification has also been amended on page 4, line 17 to add -- through an exit pupil 214-- after "212", as supported by the ray-tracing illustrated in Fig. 3.

The specification has also been amended on page 8, line 3 to change "scatters" to -- distributes--, and on page 8, line 4 to change "entrance" to --exit--, and to add --317-- after pupil, as supported by the ray-tracing illustrated in Fig. 4.

The specification has also been amended beginning on page 8, line 27 to change "unique combination of independence between the beam size and the re-imaging lens aperture and the narrow beam size" to --relative independence between the projector beam size and the re-imaging lens exit pupil, in combination with the narrow projector beam size,-- so as to improve clarity.

Claims**Summary of Claim Status**

Claims 1-43 and 46-75 are pending in the application.

Claims 33, (35, 37, 39, 41)/33, 57-60 and 63-64 stand rejected under 35 U.S.C. §251 as being an improper capture of claimed subject matter deliberately cancelled in the application for the patent upon which the present reissue is based.

Claims 32-43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kato et al. (U.S. Patent No. 5,817,597) in view of Opitek et al. (U.S. Patent No. 3,915,548).

Claims 32-43, 66-69 and 72-73 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Wood (U.S. Patent No. 4,669,810) in view of Kato et al. (U.S. Patent No. 5,817,597) and Opitek et al. (U.S. Patent No. 3,915,548).

Claims 1-2, 7, 10-12, 15-16, 29 and 30 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Macken (U.S. Patent No. 4,480,169).

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Claims 3-5, 8-9, 17-28, 31-43, 46-48, 51-61 and 63-65 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Macken (U.S. Patent No. 4,480,169) in view of Kato et al. (U.S. Patent No. 5,817,597).

Claims 6, 13-14, 49-50, 62, 70-71, 74 and 75 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Summary of Claim Amendments

Claims 32 and 33 have been amended as follows, to state that the means for re-imaging the intermediate image forms a virtual image, as supported by the specification on col. 8, lines 3-6, and by Fig. 4., wherein additions relative to the previous amendment underlined:

32. An optical system, comprising:

- d. a modulated scanning beam of light for forming an intermediate image;
- e. a light redistributing means positioned proximate to said intermediate image for expanding a cone of light incident on said light redistributing means into a larger cone of exodus; and
- f. a re-imaging means for re-imaging said intermediate image so as to form a virtual image, wherein said re-imaging means forms an exit pupil.

33. An optical system, comprising:

- a. a modulated scanning beam of light for forming an intermediate image;
- b. a means for re-imaging said intermediate image so as to form a virtual image, wherein said means for re-imaging said intermediate image forms an exit pupil; and
- c. a light redistributing means positioned proximate to said intermediate image for expanding said exit pupil.

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Claim Rejections Under 35 U.S.C. §251

Claims 33, (35, 37, 39, 41)/33, 57-60 and 63-64 stand rejected under 35 U.S.C. §251 as being an improper capture of claimed subject matter deliberately cancelled in the application for the patent upon which the present reissue is based.

Applicant respectfully submits that, as best understood, the Examiner has applied an improper standard in ascertaining whether the claims in the reissue application improperly recapture claimed subject matter that had been deliberately cancelled. The Examiner appears to assert that if cancelled claims 1 and 7/1 read on claims 33 and 57 of the reissue application, then claims 33 and 57 are improperly capturing the claims subject matter of cancelled claims 1 and 7/1. On the contrary, Applicant respectfully submits that the proper standard as to whether or not a claim in a reissue application improperly recaptures subject matter of a cancelled claim is whether or not the claim in the reissue application was narrowed with respect to the cancelled claim in an aspect germane to the prior art rejection to the canceled claim. See *In re Clement*, 45 USPQ 2d 1161, 1165 (Fed. Cir. 1997)¹ and *Mentor Corp. v. Coloplast Inc.*, 27 USPQ 2d 1521, 1525 (Fed. Cir. 1993)².

Accordingly, a reissue claim that is properly narrowed with respect to a cancelled claim could inherently be read upon by the canceled claim, because of the canceled claim being relatively broader than the reissue claim.

Applicant respectfully traverses the rejections of claim 33 and 57 because these claims are of different scope than the claims cancelled in the original application, and in particular, are narrower in at least one aspect germane to the prior art rejection of claims 7/1 and 8/1. The following Tables 1-4 are provided in support of this argument. Each table compares claims 33

¹ [T]he following principles flow: (1) if the reissue claim is as broad as or broader than the canceled or amended claim in all aspects, the recapture rule bars the claim; (2) if it is narrower in all aspects, the recapture rule does not apply, but other rejections are possible; (3) if the reissue claim is broader in some aspects, but narrower in others, then: (a) if the reissue claim is as broad as or broader in an aspect germane to a prior art rejection, but narrower in another aspect completely unrelated to the rejection, the recapture rule bars the claim; (b) if the reissue claim is narrower in an aspect germane to prior art rejection, and broader in an aspect unrelated to the rejection, the recapture rule does not bar the claim, but other rejections are possible.

² Reissue claims that are broader in certain respects and narrower in others may avoid the effect of the recapture rule. If a reissue claim is broader in a way that does not attempt to reclaim what was surrendered earlier, the recapture rule may not apply.

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and 57 of the reissue application with a different claim that had been canceled from the original application. The canceled claims are written in equivalent independent form, including all of the limitations of the base claim and any intervening claims. As to the original cancelled claims, the limitations from the associated dependent claim are shown in *italic font*, additions by amendment to the underlying independent claim are shown underlined, and deletions by amendment from the underlying independent claim are shown in ~~[strikethrough font within brackets]~~. As to the reissue claims, matter therein that is common to the original canceled claim is shown in *italic font*, and matter that is narrower than the original canceled claim is shown underlined.

Referring to Table 1, claims 33 and 57 are compared with canceled claim 7/1 as originally filed and then canceled by the first amendment in the application for the patent upon which the present reissue is based.

Table 1

Original Claims Cancelled By Amendment <i>Italic = limitation from dependent claim</i> <u>Underline / [strikethrough] = amendment</u>	Reissue Claims <i>Italic = matter common to original claim</i> <u>Underline = matter narrower than original claim</u>
<p>7/1. An optical system comprising: means for forming an intermediate image of an object, <i>wherein said means for forming an intermediate image comprises a projection means which produces a modulated scanning light beam to form the intermediate image;</i> a convergent reflective surface positioned proximate the intermediate image for reflecting the intermediate image; and means for re-imaging the intermediate image to form a new image at a location displaced from said means for forming.</p>	<p>33. An optical system, comprising: a. a modulated scanning beam of light for forming an intermediate image; b. a means for re-imaging said intermediate image <u>so as to form a virtual image</u>, <i>wherein said means for re-imaging said intermediate image forms an exit pupil;</i> and c. a light redistributing means positioned proximate to said intermediate image <u>for expanding said exit pupil.</u></p> <p>57. A method of generating an image, comprising: a. forming an intermediate image <u>on a light redistributing screen</u> with a scanning modulated beam of light, <i>wherein said light redistributing screen redistributes light from said beam of light of said intermediate image;</i> and b. re-imaging <u>said light redistributed from said light redistributing screen</u> <u>so as to form an image of said intermediate image.</u></p>

Claim 33 incorporates the following limitations not incorporated in canceled claim 7/1: 1) the limitation that the means for re-imaging the intermediate image forms a virtual image, 2) the limitation that the means for re-imaging the intermediate image forms an exit pupil, and 3) the limitation of a light redistributing means for expanding the exit pupil. For example, claim 7/1

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covers the following aspects that are not covered by claim 33: 1) means for re-imaging the intermediate image that forms a real image, 2) a convergent reflective surface comprising a specular reflector, and 3) a means for re-imaging the intermediate image that forms an exit pupil. Moreover, claim 7/1 does not incorporate the limitation in claim 33 of "a light redistributing means positioned proximate to said intermediate image for expanding said exit pupil".

Claim 57 incorporates the following limitations not incorporated in canceled claim 7/1: 1) the limitation that the intermediate image is formed on a light redistributing screen, wherein the light redistributing screen redistributes light from the beam of light of the intermediate image, and 2) the limitation of re-imaging the light from the light re-distributing screen. For example, claim 7/1 covers the following aspect that is not covered by claim 57: a convergent reflective surface comprising a specular reflector.

Table 2

Original Claims Cancelled By Amendment <i>Italic = limitation from dependent claim</i> <u>Underline</u> / [strike through] = amendment	Reissue Claims <i>Italic = matter common to original claim</i> <u>Underline</u> = matter narrower than original claim
<p>8/1. An optical system comprising:</p> <p>means for forming an intermediate image of an object, <i>wherein the light forming said intermediate image has a predetermined cone of incidence;</i></p> <p>a convergent reflective surface positioned proximate the intermediate image for reflecting the intermediate image, <i>wherein said convergent reflective surface comprises means for redistributing the light incident on any point of said surface into a cone of exodus larger than said cone of incidence;</i> and</p> <p>means for re-imaging the intermediate image to form a new image at a location displaced from said means for forming.</p>	<p>33. An optical system, comprising:</p> <p>a. <u>a modulated scanning beam of light for forming an intermediate image;</u></p> <p>b. <u>a means for re-imaging said intermediate image so as to form a virtual image, wherein said means for re-imaging said intermediate image forms an exit pupil;</u> and</p> <p>c. <u>a light redistributing means positioned proximate to said intermediate image for expanding said exit pupil.</u></p> <p>57. A method of generating an image, comprising:</p> <p>a. forming an intermediate image on a light redistributing screen <u>with a scanning modulated beam of light</u>, wherein said light redistributing screen redistributes light from said beam of light of said intermediate image; and</p> <p>b. re-imaging said light redistributed from said light redistributing screen so as to form an image of said intermediate image.</p>

Referring to Tables 2-4, claims 33 and 57 are compared with various versions of claim 8, which was amended twice and then finally canceled by the third amendment in the application for the patent upon which the present reissue is based.. Claims 33 and 57 are compared in Table 2 with canceled claim 8/1 as originally filed; claims 33 and 57 are compared in Table 3 with

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canceled claim 8/1 (designated as 8.1/1) as once amended; and claims 33 and 57 are compared in Table 4 with canceled claim 8/1 (designated as 8.2) as twice amended.

Table 3

Original Claims Cancelled By Amendment <i>Italic = limitation from dependent claim</i> <u>Underline / [strike through] = amendment</u>	Reissue Claims <i>Italic = matter common to original claim</i> <u>Underline = matter narrower than original claim</u>
<p>8.1/1 An optical system comprising:</p> <p>means for forming an intermediate image of an object, <i>wherein the light forming said intermediate image has a predetermined cone of incidence;</i></p> <p>a convergent reflective surface positioned proximate the intermediate image for reflecting the intermediate image, <u>wherein said convergent reflective surface comprises a concave mirror substrate having a front surface and a back surface provided with a reflective coating, wherein said mirror substrate corrects optical aberrations in said intermediate image produced by said forming means, and precorrects for optical aberrations produced by said re-imaging means after said intermediate image is reflected by said reflective coating, and said convergent reflective surface comprises means for redistributing the light incident on any point of said surface into a cone of exodus larger than said cone of incidence; and</u></p> <p>means for re-imaging the intermediate image to form a new image at a location displaced from said means for forming.</p>	<p>33. An optical system, comprising:</p> <p>a. <u>a modulated scanning beam of light for forming an intermediate image;</u></p> <p>b. <u>a means for re-imaging said intermediate image so as to form a virtual image, wherein said means for re-imaging said intermediate image forms an exit pupil; and</u></p> <p>c. <u>a light redistributing means positioned proximate to said intermediate image for expanding said exit pupil.</u></p> <p>57. A method of generating an image, comprising:</p> <p>a. <u>forming an intermediate image on a light redistributing screen with a scanning modulated beam of light, wherein said light redistributing screen redistributes light from said beam of light of said intermediate image; and</u></p> <p>b. <u>re-imaging said light redistributed from said light redistributing screen so as to form an image of said intermediate image.</u></p>

Claim 33 incorporates the following limitations not incorporated in any of canceled claims 8/1, 8.1/1 or 8.2/1: 1) the limitation of a modulated scanning beam of light for forming an intermediate image, 2) the limitation that the means for re-imaging the intermediate image forms a virtual image, 3) the limitation that the means for re-imaging the intermediate image forms an exit pupil, and 4) the limitation of a light redistributing means for expanding the exit pupil. For example, claims 8/1, 8.1/1 and 8.2/1 covers the following aspects that are not covered by claim 33: 1) an image source – e.g. a CRT or LCD display – other than a modulated scanning beam of light, together with associated projection optics, 2) a means for re-imaging the intermediate image that forms a real image, and 3) a means for re-imaging the intermediate image that forms an exit pupil. Moreover, neither claims 8/1, 8.1/1 nor 8.2/1 incorporate the limitation in claim 33 that the light redistributing means positioned proximate to said intermediate image expands the exit pupil formed by the means for re-imaging.

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Claim 57 incorporates the following limitation not incorporated in any of canceled claims 8/1, 8.1/1 or 8.2/1: a scanning modulated beam of light for forming the intermediate image on the light redistributing means.. For example, claim 8/1 covers the following aspect that is not covered by claim 57: an image source -- e.g. a CRT or LCD display -- other than a modulated scanning beam of light, together with associated projection optics.

Table 4

Original Claims Cancelled By Amendment <i>Italic = limitation from dependent claim</i> <u>Underline</u> / (strike through) = amendment	Reissue Claims <i>Italic = matter common to original claim</i> <u>Underline</u> = matter narrower than original claim
<p>8.2/1 An optical system comprising: means for forming an intermediate image of an object, <i>wherein the light forming said intermediate image has a predetermined cone of incidence;</i> a convergent reflective surface positioned proximate the intermediate image for reflecting the intermediate image, wherein said convergent reflective surface comprises a concave mirror substrate having a front surface and a back surface provided with a reflective coating[, wherein said mirror substrate corrects optical aberrations in said intermediate image produced by said forming means, and precorrects for optical aberrations produced by said re-imaging means after said intermediate image is reflected by said reflective coating], and said convergent reflective surface comprises means for redistributing the light incident on any point of said surface into a cone of exodus larger than said cone of incidence; and means for re-imaging the intermediate image to form a new image at a location displaced from said <u>forming means</u>[for forming], wherein the front and back surfaces of said mirror substrate are <u>formed to correct optical aberrations in said intermediate image produced by said forming means as light passes through said substrate, and, upon reflection by said reflective coating, to produce optical aberrations which cancel with aberrations produced by said re-imaging means after said intermediate image is reflected.</u></p>	<p>33. <i>An optical system, comprising:</i> a. <u>a modulated scanning beam of light for forming an intermediate image;</u> b. <u>a means for re-imaging said intermediate image so as to form a virtual image, wherein said means for re-imaging said intermediate image forms an exit pupil;</u> and c. <u>a light redistributing means positioned proximate to said intermediate image for expanding said exit pupil.</u></p> <p>57. <i>A method of generating an image, comprising:</i> a. <u>forming an intermediate image on a light redistributing screen with a scanning modulated beam of light,</u> wherein said light redistributing screen redistributes light from said beam of light of said intermediate image; and b. <u>re-imaging said light redistributed from said light redistributing screen so as to form an image of said intermediate image.</u></p>

Accordingly, Applicant respectfully submits that both claims 33 and 57 are each narrower in at least one respect with respect to any one claim of the original application, and accordingly neither claims 33 nor 57 improperly recapture matter that had been canceled in the original application. Applicant respectfully requests reconsideration and withdrawal of the rejections of claims 33 and 57 under 35 U.S.C. §251.

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Claims 35/33, 37/33, 39/33 and 41/33 each provide further limitation to claim 33, and accordingly are also different in scope from either claims 1, 7/1, or 8/1 of the original application at least for the same reasons as for claim 33. Claims 58/57, 59/58/57, 60/57, 63/57 and 64/57 each provide further limitation to claim 57, and accordingly are also different in scope from either claims 1, 7/1, or 8/1 of the original application at least for the same reasons as for claim 57. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejections of claims 35, 37, 39, 41, 58-60 and 63-64 under 35 U.S.C. §251, for the same reasons as for claims 33 and 57.

Claim Rejections Under 35 U.S.C. §103(a) over Kato et al. in view of Opitek et al.

Claims 32-43 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kato et al. (U.S. Patent No. 5,817,597) in view of Opitek et al. (U.S. Patent No. 3,915,548).

Claims 32 and 33 have been amended to incorporate the limitation that the re-imaging means forms a virtual image. Applicant respectfully submits that neither Kato et al. nor Opitek et al. teach or suggest a re-imaging means that forms both an exit pupil and a virtual image, in combination with a light redistributing means positioned proximate to said intermediate image for either for expanding an exit pupil or a means for re-imaging or for expanding a cone of light incident on said light redistributing means into a larger cone of exodus. The amendments to claims 32 and 33 preclude the human eye as a re-imaging means, because the human eye forms a real image on the retina.

Kato et al., as best understood, discloses the formation of a real image proximate to a hologram, so that this same hologram cannot then be used to form a virtual image of that real image, but instead, another optical element --not disclosed by Kato et al. -- at another location, would be required as a re-imaging means.

Opitek et al., as best understood, does not disclose or suggest the formation of an intermediate image proximate to a light redistributing means. On the contrary, Fig. 2 of Opitek et al. clearly shows the virtual image 26 formed by the relay lens 25 at a location that is substantially displaced from the holographic lens 20. Accordingly, Applicant respectfully submits that there would be no motivation for one of ordinary skill to follow the Examiner's

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suggestion to adapt the system of Opitek et al. to use an optical element (holographic lens 20) for providing an exit pupil for re-imaging the intermediate image provided by the source (21) and the relay [focusing] lens (25), in a system for which the intermediate image is positioned proximate to the light redistributing means (holographic lens 20). Applicant respectfully submits that such a system would not be workable, as the holographic lens 20 would be incapable of forming a virtual image of an intermediate image position proximate to the same holographic lens 20. Moreover, Applicant notes that whereas, as indicated by the Examiner, Opitek et al. discloses a modulated laser scanning system at col. 6, lines 64-68, Opitek does not disclose or suggest using the modulated laser scanning system to form an intermediate image at a light redistributing means (e.g. holographic lens 20 of Opitek).

Because neither Kato et al. nor Opitek et al. disclose or suggest all of the limitations of either claims 32 or 33 as amended, then claims 32 and 33 are non-obvious with respect to Kato et al. and Opitek et al., and therefore in a condition for allowance. Applicant respectfully requests reconsideration and allowance of amended claims 32 and 33.

Claims 34/32, 35/33, 36/32, 37/33, 38/32, 39/33, 40/32, 41/33, 42/32 and 43/33 each depend upon either claims 32 or 33. Accordingly, Applicant respectfully submits that if the above argument regarding the non-obviousness of claims 32 and 33 is accepted, then claims 34-43 are also non-obvious with respect to Kato et al., with or without Opitek et al., because the addition of further limitations to an already novel and non-obvious claim does not negate non-obviousness. Applicant requests reconsideration and allowance of claims 34-43 in view of the above argument and the amendments submitted herewith.

Claim Rejections Under 35 U.S.C. §103(a) over Wood in view of Kato et al. and Opitek et al.

Claims 32-43, 66-69 and 72-73 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Wood (U.S. Patent No. 4,669,810) in view of Kato et al. (U.S. Patent No. 5,817,597) and Opitek et al. (U.S. Patent No. 3,915,548).

The Examiner has acknowledged that Wood does not clearly state that the position of the holographic element is located proximate to -- or at -- the position of the intermediate image as claimed in claims 32, 33 and 66. Notwithstanding this, the Examiner asserts that it would have

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been obvious to one skilled in the art to modify the optical system provided by Wood by rearranging the position of the holographic element (28) at a position proximately or on the position of the intermediate image formed by the imaging means as suggested by Kato et al. for the purpose of providing an image with better focus and brightness *while still maintaining the function of correcting the image aberrations occurred by the imaging means and the re-imaging means in the system*. Applicant respectfully submits that one of ordinary skill in the art would not modify the optical system of Kato et al. as suggested by the Examiner because such a modification to Wood would degrade the function of correcting for off-axis aberrations in the combiner (12) by the holographic element (28). On the contrary, Applicant respectfully submits that it is generally known that aberrations are corrected by transformation -- e.g. by reflection, refraction or diffraction -- of the light associated with an image, at a location that is displaced from, i.e. not proximate to, that of the image. Accordingly, since there would be no motivation for one of ordinary skill in the art to combine the teachings of Wood and Kato et al., Applicant respectfully submits that it is improper to combine these references in rejecting claims 32, 33 and 66.

Regarding the source for providing light to form the intermediate image, Applicant respectfully submits that the Examiner has taken out of context the matter on col. 4, lines 20-23 of the specification of the instant application. More particularly, the matter on col. 4, lines 20-23 is in reference to the third embodiment illustrated in Fig. 3, and not in reference to the embodiment of Fig. 4 that illustrates an example of an embodiment in accordance with claims 32, 33 and 66. Furthermore, notwithstanding that Opitek et al. discloses a modulated laser scanning system at col. 6, lines 64-68, Opitek does not disclose or suggest using the modulated laser scanning system to form an intermediate image at either a light redistributing means or a projection surface (e.g. holographic lens 20 of Opitek).

Regarding claim 66, Applicant respectfully submits that neither Wood, Kato et al. nor Opitek et al. disclose or suggest an optical system incorporating a projection screen comprising a light redistributing means, wherein an intensity of a scanning modulated beam of light is modulated to form an intermediate image on the projection surface.

Because neither Wood, Kato et al. nor Opitek et al. disclose or suggest all of the limitations of either claims 32, 33 or 66, then claims 32, 33 and 66 are non-obvious with respect

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to Wood, Kato et al. and Opitek et al., and therefore in a condition for allowance. Applicant respectfully requests reconsideration and allowance of amended claims 32, 33 and 66.

Claims 34/32, 35/33, 36/32, 37/33, 38/32, 39/33, 40/32, 41/33, 42/32, 43/33, 67/66, 68/66, 69/66, 72/66 and 73/72/55 each depend upon either claims 32, 33 or 66. Accordingly, Applicant respectfully submits that if the above argument regarding the non-obviousness of claims 32, 33 and 66 is accepted, then claims 34-43, 67-69 and 72-73 are also non-obvious with respect to Wood in view of Kato et al., and Opitek et al., because the addition of further limitations to an already novel and non-obvious claim does not negate non-obviousness. Applicant requests reconsideration and allowance of claims 34-43, 67-69 and 72-73 in view of the above argument and the amendments submitted herewith.

Claim Rejections Under 35 U.S.C. §103(a) over Macken

Claims 1-2, 7, 10-12, 15-16, 29 and 30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Macken (U.S. Patent No. 4,480,169).

As best understood, Macken discloses a non-contact laser engraving apparatus that incorporates an optical system. The optical system of Macken comprises a laser source 10 that emits a laser beam 12, and either a focusing lens 14 or a mirror 40 that focuses the laser beam 12 onto a cylindrical mirror 20. Accordingly, the focused laser beam on the cylindrical mirror 20 is not an image of the laser beam 12, but is instead a spatial Fourier Transform of the image of the laser beam 12 if the focussing lens is located one focal length from the cylindrical mirror 20 as illustrated in Figs. 1, 3 and 4 of Macken. Accordingly, the laser source 10 and focusing lens 14 cannot be considered to be "an imaging means for forming an intermediate image" in accordance with claims 1, 10 or 16 of the instant application, and therefor is not relevant to these claims. 

The optical system of Macken further comprises an imaging system that images the focussed laser beam upon a workpiece 26. Figs. 1, 3 and 4 of Macken disclose three different imaging systems respectively.

The imaging system disclosed by Macken in Fig. 1 comprises a focusing lens 24. If this lens were considered to correspond to the imaging means of claims 1, 10 and 16 of the instant application, then Mack n does not disclose that the focusing lens 24 produces at least one first

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aberration in the light exiting this lens, nor does Macken disclose a) a means for reversing or substantially reversing at least one of the at least one first aberration or b) a re-imaging means as recited in claims 1, 10 and 16 of the instant application.. Accordingly, the imaging system disclosed by Macken in Fig. 1 does not disclose or suggest the all of the elements and limitations of claims 1, 10 or 16, and accordingly is not a proper reference under 35 U.S.C. §103(a).

The imaging system disclosed by Macken in Fig. 3 comprises a focusing lens 34 in cooperation with folding mirrors 32, 36. The folding mirrors 32, 36 provide for folding an associated optical path, but otherwise do not satisfy any of the limitations of a) a means for reversing or substantially reversing at least one of the at least one first aberration or b) a re-imaging means as recited in claims 1, 10 and 16 of the instant application. Accordingly, the imaging system disclosed by Macken in Fig. 3 does not disclose or suggest the all of the elements and limitations of claims 1, 10 or 16, and accordingly is not a proper reference under 35 U.S.C. §103(a).

The imaging system disclosed by Macken in Fig. 4 comprises a spherical focusing mirror 50 in cooperation with folding mirrors 46, 48. The folding mirrors 46, 48 provide for folding an associated optical path, but otherwise do not satisfy any of the limitations of a) a means for reversing or substantially reversing at least one of the at least one first aberration or b) a re-imaging means as recited in claims 1, 10 and 16 of the instant application. Macken further discloses on col. 7, lines 40-55 conditions that are desirable for reducing spherical aberrations introduced by the spherical focusing mirror 50. However, these are conditions on the imaging means only. Macken does not provide for the limitations of a) a means for reversing or substantially reversing at least one of the at least one first aberration or b) a re-imaging means as recited in claims 1, 10 and 16 of the instant application. As an alternative interpretation of Macken in view of the instant application, if the spherical focusing mirror 50 were to be considered as a means for reversing at least one aberration, then Macken does not disclose either an associated imaging means or an associated re-imaging means, nor does Macken disclose an intermediate image positioned proximate to the means for reversing at least one aberration. Accordingly, the imaging system disclosed by Macken in Fig. 4 does not disclose or suggest the all of the elements and limitations of claims 1, 10 or 16, and accordingly is not a proper reference under 35 U.S.C. §103(a).

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Because Macken neither discloses nor suggests all of the limitations of either claims 1, 10 or 16, then claims 1, 10, and 16 are non-obvious with respect to Macken, and therefore in a condition for allowance. Applicant respectfully requests reconsideration and allowance of claims 1, 10, and 16.

Claims 2/1, 7/1, 11/10, 12/10, 15/10, 29/10, and 30/16 each depend upon either claims 1, 10 or 16. Accordingly, Applicant respectfully submits that if the above argument regarding the non-obviousness of claims 1, 10, and 16 is accepted, then claims 2, 7, 11, 12, 15, 29 and 30 are also non-obvious with respect to Macken, because the addition of further limitations to an already novel and non-obvious claim does not negate non-obviousness. Applicant requests reconsideration and allowance of claims 2, 7, 11, 12, 15, 29 and 30 in view of the above argument.

Claim Rejections Under 35 U.S.C. §103(a) over Macken in view of Kato et al

Claims 3-5, 8-9, 17-28, 31-43, 46-48, 51-61 and 63-65 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Macken (U.S. Patent No. 4,480,169) in view of Kato et al. (U.S. Patent No. 5,817,597).

Applicant respectfully traverses the rejection of claims 31, 32, 33, 47, 53 and 57, for the same reasons as are already of record, and for further reasons discussed herein in response to the Examiner's most recent comments. The Examiner has asserted that Macken meets all of the limitations of the device as claimed except the feature of the cylindrical mirror having a light redistributing surface for the purpose of expanding the cone of the incident light be an it exit pupil. As discussed hereinabove, Macken does not meet all of the non-excepted limitations. The focusing lens 14, or mirror 40, does not form an intermediate image of the laser beam 12 on the cylindrical mirror; instead it focuses the laser beam 12 to form a spot, which spot is not an intermediate image, but is instead a spatial Fourier Transform of the light distribution of the laser beam 12 if the focusing lens is one focal length from the cylindrical mirror 20. Furthermore, the focusing lens 24 is not disclosed as producing at least one aberration in the "intermediate image"; nor is the cylindrical mirror 20 disclosed as reversing that non-disclosed at least one aberration; nor are the focusing lenses 24, 34 or the spherical focussing mirror 50 disclosed as having at least one second aberration that is similar to the non-disclosed at least one first

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aberration of the focusing lens 14, or mirror 40. Accordingly, as to claims 31, 32, 33, 47, 53 and 57, Macken is not a proper reference under 35 U.S.C. §103(a) to begin with, nor does its combination with Kato et al. remedy this deficiency, so there would be no motivation for one of ordinary skill in the art to combine Kato et al. with Macken. Because neither Macken nor Kato et al. disclose nor suggest all of the limitations of any of claims 31, 32, 33, 47, 53 or 57, then claims 31, 32, 33, 47, 53 and 57 are non-obvious with respect to Macken and Kato et al., and therefore in a condition for allowance. Applicant respectfully requests reconsideration and allowance of claims 31, 32, 33, 47, 53 and 57.

Claims 3/2/1, 4/2/1, 5/1, 8/7/1, 9/1, 17/10, 18/16, 19/10, 20/16, 21/17/10, 22/18/16, 23/19/18, 24/20/16, 25/17/10, 26/18/16, 27/19/10, 28/20/16, 34/32, 35/33, 36/32, 37/33, 38/32, 39/33, 40/32, 41/33, 42/32, 43/33, 46/1, 48/47, 51/47, 52/47, 54/53, 55/53, 56/53, 58/57, 59/58/57, 60/57, 61/59/58/57, 63/57, 64/57 and 65/57 each depend upon either claims 1, 10, 16, 32, 33, 47, 53 or 57. Accordingly, Applicant respectfully submits that if the above argument regarding the non-obviousness of claims 1, 10, 16, 32, 33, 47, 53 and 57 is accepted, then claims 3-5, 8-9, 17-28, 34-43, 46, 48, 51-56, 58-61 and 63-65 are also non-obvious with respect to Macken and Kato et al., because the addition of further limitations to an already novel and non-obvious claim does not negate non-obviousness. Applicant requests reconsideration and allowance of claims 3-5, 8-9, 17-28, 34-43, 46, 48, 51-56, 58-61 and 63-65 in view of the above argument.

Applicant continues to traverse the rejections of claims 4/2/1, 9/1, 21/17/10, 22/18/16, 23/19/18, 24/20/16, 46/1, 51/47, 54/53 and 64/57 for the same reasons as are already of record.

Furthermore, with regards to claim 63/57, Applicant respectfully submits that neither Macken nor Kato et al. disclose or suggest a system for which an image of an intermediate image comprises a virtual image. Because neither Macken nor Kato et al. disclose or suggest all of the limitations of claim 63, then claim 63 is non-obvious with respect to Macken and Kato et al., and therefore in a condition for allowance. Applicant respectfully requests reconsideration and allowance of claim 63.

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Extension of Time and Payment of Fees Under 1.17(a)(2)

Applicant hereby petitions for a Three-Month Extension of Time, pursuant to 37 C.F.R. §1.136, extending the deadline for response up to and including December 4, 2001. A Credit Card Payment Form in the amount of \$460.00 is enclosed in payment of the associated Three-Month Extension of Time fee pursuant to 37 C.F.R. §1.17(a)(2).

Summary and Conclusions

The specification and drawings have been amended to correct errors. Claims 32 and 33 have been amended to add a limitation thereto. The rejections of all claims in their present form have been traversed. Applicant submits that no new matter has been added by this Amendment.

Applicant respectfully requests reconsideration of the instant application as amended herein in view of the arguments hereinabove. Applicant respectfully submits that the instant application is now in the proper form for Notice of Allowance.

Respectfully Submitted,



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